	Zenith Distance of the Sun's Centre. By Computation.	Actual Observation.	Refraction and Parallax.	Barom. Ins. Pts.	Therm. Fahr.
	° ′ ″	° ′ ″	′ ″		°
1840, May 11	90 53 47·7	90 20 56	32 51·7	29·64	77
1844, July 30	52 56·8	,,	32 0·8	·57	79
1846, May 13	53 42·4	,,	32 46·4	·61	79
17	53 37·6	,,	32 41·6	·55	78
1848, Feb. 17	90 53 22·7	,,	32 26·7	·55	70
	17)905 12·8		549 20·3	15)92·85	16)1240
	90 53 10·84	90 20·56	32 18·84	29·619	77·5
1857, Oct. 27*	90 53 25	,,	32 29	29·547	77·5
30	53 19	,,	32 23	·602	78
Nov. 1	53 22·6	,,	32 26·6	·593	78·6

The altitude of my Observatory above the level of the sea, 440 English feet, causes a depression in the barometer of 0·455 inch.

From my station, the rising of the Sun from the horizon of the sea can only be seen in May, June, July, part of October, November, and February. The setting of the Sun into the horizon of the sea, not at all. Moreover I have sometimes every morning, for six weeks running, watched, disappointed, to get an observation on his rising, in consequence of dense low clouds of cumuli at horizon. To this day I have not obtained a single observation this year. So it is not so easy a matter as may be imagined.

St. Croix, 11th July, 1862.

On the Practicability of observing the Occultation of Stars by the Moon at Sea. By David Smith, Esq.

The author, in his communication addressed to the President and Council of the Society, writes as follows:—

It is not without some degree of hesitation that I take the liberty of forwarding you the results of my own experience as regards the practicability of observing Occultations of Stars at sea. The desire I feel that this most invaluable method for determining the Longitude may come into more general use amongst Naval men will, I trust, be a sufficient apology for my addressing you.

The method, as far as I can ascertain, has been, but with few exceptions, wholly neglected at sea: this has, no doubt, arisen from a supposition that the motion of a vessel would

* "An admirable observation" is added to the observation in my Journal.

prevent using a telescope of sufficient power to observe the phenomena, as the stars most frequently occulted are small. Another reason may be, that a previous knowledge of the star or its relative position to the larger stars is requisite.

With respect to the objection on account of the vessel's motion, I have only to state that except when a ship is very uneasy and laboursome, that stars up to the third magnitude can easily be observed disappearing or reappearing at the Moon's dark limb; and that in smooth water, and the Moon not nearer than three days from the opposition, stars between the fourth and fifth magnitude can be observed with great precision.

As regards the power of the telescope employed, all that is necessary is a good ship's glass, such as are usually sold for 3*l.* or 4*l.* With instruments of this description I have observed ten occultations, which have yielded unexceptionable results. They stand as under:—

Disappearance of	*	Regulus on the Moon's dark limb.		
,,	*	*b* Ophiuchi	,,	,,
,,	*	h^2 Sagittarii	,,	,,
,,		Saturn	,,	,,
,,	*	ϕ Sagittarii	,,	,,
,,	*	Antares on the Moon's bright limb.		

Reappearance of	*	Antares on the Moon's dark limb.		
,,	*	η Piscium	,,	,,
,,	*	η Tauri	,,	,,
,,	*	27 Tauri	,,	,,

The two last-named stars were observed on the same night, and the results agreed to within two seconds of time.

In the case of the star h^2 *Sagittarii*, the star seemed to advance upon the Moon's disk before disappearance.

The disappearance of *Antares* on the Moon's bright limb gave a very satisfactory result, as was verified on our arrival at Colombo, Ceylon, some ten days after.

I may add that I have found Captain Shadwell's Tables (for finding the approximate times of beginning and ending) of great assistance, being concise and easy of application, and invaluable for finding the time of reappearance.

In the annexed papers I have given the calculation of the longitude by the Occultations of η *Piscium*, η *Tauri*, and 27 *Tauri*.

I may also state that I have observed the termination of two Solar Eclipses at sea. The resulting longitudes were very exact. One happened two days after leaving port, and the

other in sight of the Island of Basilan, near Mindanao; so that the chronometer's errors were well known.

By means of the Eclipse of the Sun and the Occultation of the star *η Piscium*, carried on by a very steady chronometer, I have during my last voyage been enabled to check the Longitudes of several most important points in the Eastern Archipelago.

Lavender Wharf, Rotherhithe, S. E.,
July 24th, 1862.

The following is one of the three calculated Occultations above referred to.

Occultation of ✱ η Piscium by the Moon.

On board the ship Marchioness, of Londonderry, July 1861, in the Java Sea; latitude 4° 49′·3 south; longitude by account 114° 55′ east. I observed the reappearance of the star *η Piscium* on the Moon's dark limb to take place on July 28th, $15^h\ 25^m\ 8^s$ apparent time at ship. A chronometer showed at the same time, $7^h\ 48^m\ 46^s$, its assumed error on Greenwich Mean Time being $2^m\ 50^s$ slow. Required the longitude of the ship, and the chronometer's error on Greenwich Mean Time by this observation.

		h m s
Time of emersion by chronometer, July 28th		7 48 46
Chronometer's assumed error, slow...........	=	+ 2 50
Greenwich date of observation	=	7 51 36

at which time we have the Sun's Right Ascension $=8^h\ 31^m\ 59^s$, Moon's Declination 14° 21′ N., Moon's Equatoreal Horizontal Parallax =54′ 16″·0, Moon's Semidiameter =14′ 49″·2, the Star's Right Ascension $1^h 24^m 6^s{\cdot}17$, Star's Declination =14° 37′ 58″·6 N., Reduction of Latitude −1′ 55″, log. radius of the Earth at the place =9·99999.

		h m s			
Sun's right ascension........	=	8 31 59			
Apparent time	=	15 25 8			
Right ascension of meridian	=	23 57 7	Latitude	=	4° 49′·3 S.
Star's right ascension	=	1 24 6	Reduct.	=	− 1·9
Star's hour-angle in time E.	=	1 26 59	Geocentric lat.	=	4 47·4 S.
h = ,, in arc	=	21° 44′ 45″			

☽'s equat. hor. par. log. 3·51268
Log. radius of Earth ... 9·99999

Log. reduced parallax	3·51267		3·51267		=3·51267
Latitude, cosine	9·99848	sine........	8·92161	cosine ...	=9·99848
✱'s hour-angle h, sine	9·56876	✱'s δ, cosine	9·98568	✱'s δ, sine	=9·40248
				(h), cosine	=9·96846
p =	3·07991	K=263″·0=	2·41996		
☽'s declination, cos	9·98623			K′=−762″·2=	2·88209
	3·09368	K =	−263″·0		
Constant logarithm......	7·92082	K′=	−762·2		
Cor. of ✱'s hour-ang. = −10′·34 =	1·01450	K+K′=−1025·2=cor. ✱'s decl.	=17′5″·2		

✱'s hour-angle	= h = 21° 44′·75	✱'s declination	= 14h 37m 58s·6 N.
Correction as above	− 10·34	K+K′−corr.	= − 17 5·2
✱'s hour-angle corrd. = (h)	= 21 34·41	✱'s decl. corrd.	= 14 20 53·4 N.

Computation of the first part of the Moon's Parallax in Right Ascension:—

Log p as in the preceding part =3·07991
✱'s corrected declination cos =9·98623

3·09368
Constant logarithm=8·82391

First part of ☽'s par. rt. ascen. log=1·91759=82s·72 or −1m 22s·72

The ☽'s declination at the Greenwich date (corrected for 2s difference) is 14° 20′ 58″·7 N.

Computation of the second part of the Moon's Parallax in Right Ascension:—

✱'s decl. corrected 14° 20′ 53″·4 N.
☽'s declination ... 14 20 58·7 N.
mean = β = 14° 20′ 56″ N.

Diff. = 5·3 ✱ south of the ☽.
☽'s semidiameter = 14 49·2

Sum = 14 54·5=894″·5 log. =2·95158
Diff. = 14 43·9=883·9 log.=2·94640
β = 14 20 56 cosec.²=0·02753

2) 5·92551

2·96275
Log 15 constant=1·17609

Second part of ☽'s par. right ascen. = +61s·19 log 1·78666

	h m s		
✱'s right ascension	1 24 6·17		
Part 1st corr. −	1 22·72	(minus because ☽ east of meridian).	
	1 22 43·45		
Second part +	1 1·19	(plus because an emersion).	
☽'s right ascension =	1 23 44·64		
,, at 7^h =	1 22 6·31	diff. 98·33	log.......... = 1·992686
,, at 8^h =	1 24 0·57	diff. 114·26	log (ar. comp.) 7·942106
		36″·00	constant log 3·556302
Correction in time = +	$3098^s·1$ = $+51^m38^s·1$		log = 3·491094

	h m s		h m s
Greenwich time	7 0 0·0		
M.T. at Greenwich =	7 51 38·1		7 51 38·1
Equation of time = −	6 10·1	Chronometer showed	7 48 46·0
App. time at Green. =	7 45 28	Chron. slow, G.M.T. =	2 52·1
App. time at ship =	15 25 8		
Long. in time =	7 39 40		
Longitude in arc	114° 55′ 0″ E.		

N.B. An error of 2 miles in the latitude does not affect the result, an error of 10 seconds in the hour-angle of the star or apparent time makes a difference of only $4^s·6$.

The latitude had been deduced from the meridian altitude of ✱ *Schedar*, which happened soon after the occultation, and reduced to that time by the D.R. This was also checked from the preceding and following days' latitudes by the D.R. Allowing for the current, the two results agreed within half a mile.

The apparent time was deduced from four sets of observations of stars E. and W. of the meridian, taken with two different instruments, viz. two sets of ✱ *Aldebaran* E. and two sets by ✱ *Altair* W. These were again checked by observations of the Sun for time after sunrise, and agreed very closely.

Six hours after observing the occultation, we were on the meridian of the east end of the Island of Arentes, in the Java Sea. I then took sight of the Sun and Moon for time, the Sun being east and the Moon west of the meridian. The results showed the chronometer to be

	h m s	
	7 41 23·5	slow of the mean time of the place,
and the chron.-error being −	2 52·5	slow.
	7 38 31	

or the longitude of the east point of Arentes in arc = 114° 37′ 45″ E. of Greenwich.

This agrees nearly with Lieut. Raper's position: he gives the centre of the island $=114° \, 37'$. The island extends about three miles E. and W.

Forty-seven lunar distances from the Sun, viz. 31 W. and 16 E., gave the chronometer an error of $2^m \, 51^s$ slow at the time of occultation, which would assign nearly the same value for the longitude of the island as given above.

The chronometer had a steady rate of $1^s\cdot6$, losing for about seventy days.

On the Variable Star R *Vulpeculæ.* By G. Knott, Esq.

From a comparison of my own observations with Mr. Pogson's useful Ephemeris, I had been led to suspect some irregularity in the period of this star, and in a short paper, which was printed in the last volume of the *Monthly Notices*, I communicated my suspicions to the Astronomical Society. The paper appears to have come under the notice of Dr. Winnecke of Pulkowa, who, by his observations and researches, may almost be said to have made the star his own, and in a letter to the Rev. R. Main (*Monthly Notices*, vol. xxii. No. 8), adverting to the subject he remarks that he was afraid that an error of transcription had crept into the elements he communicated to Mr. Pogson, and proceeds to give his definitive epoch and period founded on "seven maxima, observed in the course of three years, with reference to Piazzi's estimations of magnitude in August 1803," together with an Ephemeris for the years 1861, 1862. My own observations of two maxima present so fair an accordance with Dr. Winnecke's predictions, that I venture to submit them to the Society, in the hope that they may possess some interest. My final results are as follow:

Observed maxima of R *Vulpeculæ*, 1861, December 30·5, mag. = 8·7. 1862, October 4, mag. = 8·2, being later than the calculated dates by $3\frac{1}{2}$ and 4 days respectively, a difference which may *possibly* be due to *personal equation*. The period deduced from these observations, viz. 138·75 days, presents also a very satisfactory agreement with that given by Dr. Winnecke, and I think we may fairly infer that R *Vulpeculæ* belongs to the class of regular variables.

Woodcroft Observatory, Cuckfield,
November 17*th*, 1862.

Description of a New mode of obtaining the Value of the Divisions of a Transit Level. By Capt. W. Noble.

I have recently been occupied in re-determining the value of the divisions of my Transit Level, by a method which, while